The Persistence of Pricing Differentials in Dual-listed Companies in Hong Kong and Mainland China

by

Yuxiang Yang

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Approved:

Faculty Advisor

Approved:

MFin Director

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Abstract

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More and more Chinese companies have been listed on Hong Kong and mainland China. The pricing differentials between Hong Kong H-shares and the corresponding China A-shares have existed persistently, even though the Hong Kong and mainland China markets have been converging continuously. This paper discusses the determinants of the persistence of the price disparity. The market movement, market and investor sentiment are found to be determinant for the H-share discounts, while the exchange rate is not significant. Also, this paper analyzes the different discount rates among some different sectors. Some sectors large discounts relative to the others, and firms in particular sectors are more correlated than the others.

Table of Contents

Chapter 1: Introduction

1.1 Background

Over the last several decades, a number of companies have issued shares on several international exchanges. Two main purposes of cross-listing are documented in the literature, namely to alleviate the potential tax consequences of a merger and to enter multiple capital markets (Spitzer and Justin, 2011). Generally, those "Siamese-twin" company stocks are based on the same ownership rights and cash flows. If capital markets are perfectly integrated, prices of cross-listed shares are supposed to be theoretically identical, despite of their locations of trade. Nevertheless, pricing differentials of cross-listed companies can be perceived in the real world. This is because of the existence of information asymmetry and market segmentation with limited arbitrage opportunities. The barriers that result in segmented markets are often too complicated to fully quantify, including restrictions on information asymmetry, restrictions on foreign ownership, capacity of the market, and language and cultural differences (Wang and Jiang, 2003).

This paper studies the pricing differentials of dual-listed companies between Chinese H-shares and A-shares. H-shares are referred to stocks of companies which are incorporated in mainland China, traded on the Hong Kong Stock Exchange (HKSE) and denominated in Hong Kong dollars. There is a stock price index for H-shares called Hang Seng China Enterprises Index (HSCEI). A-shares are referred to stocks traded on Shanghai and Shenzhen stock exchanges and denominated in Renminbi (RMB). H-shares are currently tradable by mainland-Chinese institutional investors under the Qualified Domestic Institutional Investor program (QDII) launched in

2006, but not mainland Chinese individual investors. Similarly, A-shares are not available to individual offshore investors directly, but they can access the A-share market under the Qualified Foreign Institutional Investor program (QFII) set up in 2002. The history of dual-listed companies can be traced back to 1993. The numbers of these firms are relatively small, but it has a remarkable increase for the recent years.

Historically, a price discount as a whole for H-shares relatively to A-shares has existed persistently. According to theory, the prices of a dual-listed company will converge, because the underlying cash flows for both shares are the same. Nevertheless, a significant pricing difference still exists, despite of increased integration between the mainland and Hong Kong financial markets in the recent years.

1.2 Purpose of Study

This price disparity has been studied before by many others. They have attributed the market anomaly to different kinds of factors, such as macroeconomic movements, arbitrage, regulation requirements and market cycles. Nevertheless, there is not an overarching theory that can completely account for the pricing differentials. There are always unique factors in every market that are statistically significant in a relationship compared with others (Spitzer and Justin, 2011).

The main purpose of this paper is to study and analyze the causes of the persistence of pricing differentials for H-shares relative to their corresponding A-shares with econometric methods. There are many factors in determining the price disparities.

The price disparities in the markets of developed countries can usually be attributed to factors such as the differences in reporting standards and so on. However, there are more local-specific determinants in deciding the price discounts in an immature and regulation-restricted market like mainland China. For example, cultural factors are remarkable. Chinese investors do not trust the domestic regulations as well as the public funds, because the regulations are incomplete or defective and not executed very well. Chinese investors are less experienced than the investors of developed countries. International investors are hesitant to invest in the Chinese market because of the systematic risks. On the other hand, the expected appreciation of Chinese currency and the rapid growth of Chinese economy propel international investors to enter the Chinese stock market.

Some factors are hardly identified or measurable to include in the model, while the others could be examined directly or indirectly by proxies in the model. Therefore, the results of past studies are referred to and summarized to identify and select the factors that could be statistically significant for the H-share discounts. Thus, the model used in this study could explain as much of the phenomenon of the price disparity as possible. Lots of the past studies incorporated the factors of market segmentation such as market concentration, monetary appreciation and the immaturity of the market. However, this study only focuses on exploring the persistence of the discount rates of H-shares relative to A-shares with the continuous integration of the two markets, ignoring those relatively unrelated factors.

Market and investor sentiment contributes significantly to the discounts of H-shares relative to A-shares. There is a negative relationship between the market sentiment

and the average H-share discount rates. The relative P/E ratio is used to represent the market sentiment as a proxy, as it has been proved to be an effective way by the previous studies. The overall market sentiment in this paper is calculated by dividing the Shanghai A-share Index P/E ratio to the Hang Seng China Enterprise Index P/E ratio. See the Figure 1 for the negative relationship between the market sentiment and the average H-share discounts.

In addition, this paper conducts a comparison of the sector-by-sector discount rates for firms, which are dual-listed in the Hong Kong and Shanghai markets. The differences in the price discounts of each sector would signal the investor sentiment in the specific industries. This comparison would disclose some strategic perception for investors and firms that want to list in both markets. Previous studies have revealed the relationship of the discount volatility of each sector and its business cycle. In this paper, the magnitude of sector price disparities and the movements within the industry would be studied.

1.3 Organization of Study

The paper is organized as follows. The current section is an introduction to the whole topic. It introduces the background, purpose of study and structure of the paper. The second section reviews the previous studies concerning the pricing differentials in dual-listed companies. The third section addresses data collected and regression models used in this paper. The fourth section discusses the empirical results of the analysis. The fifth section summarizes the paper.

Chapter 2: Literature Review

Chung, Hui and Li (2013) summarize the past studies of determinants of the AH price disparity in the Chinese stock markets, and classify them into six categories. First, Charkravarty et al. (1988) find that information asymmetry exists between the Mainland and Hong Kong investors, and therefore the valuations based on the same firm will be different. Second, Hietala (1989), Bailey (1994) and Fernald and Rogers (2002) argue that the risk premiums for the Mainland and Hong Kong investors are different, because the two markets are segmented. Third, Ma (1996) and Wang and Jiang (2004) argue that it is the differences in aggregate market conditions between onshore and offshore financial markets that cause the price disparity. Fourth, Chan and Kowk (2005) find that the liquidity conditions between onshore and offshore financial markets are different, which is also a cause of the pricing differentials. Fifth, Domowitz et al. (1997) and Sun and Tong argue that there are differences of demand of the Mainland and Hong Kong investors, because their investment opportunities are different. Sixth, Fong et al. (2010) point out that the special macroeconomic conditions of the mainland China also contribute to the price disparity. For example, the appreciation of the Renminbi and a continuous active trade balance can result in more saving. Thus, the mainland Chinese investors will tend to invest more in onshore markets.

Chung, Hui and Li (2013) employ the contingent claims approach to equity pricing. Thus, a previously unidentified channel of parameter uncertainty is built, through which a price disparity can happen. Also, a Bayesian analysis of the model is employed to establish parameter uncertainty as a robust factor beyond other macro and market-based factors, which explains the price disparity of AH shares. They

demonstrate that the different assessments of a firm by the investors in the Mainland and Hong Kong lead to the parameter uncertainty for price disparity. Even though their estimates for the parameters of the same model may differ only a little due to information asymmetry and market segmentation, the valuations of a firm would be significantly different consequently. Thus, it is inevitable that AH share price disparity exists.

Froot and Dabora (1998) study the causes of pricing differentials of dual listed companies. The authors present evidence that location of trade does influence pricing of stocks, due to cross-border tax rules, investor heterogeneity resulting from taxes, country-specific noise, market segmentation and institutional frictions involving informational and contractual inefficiencies etc..

Froot and Dabora (1998) take Royal Dutch Shell as an example of Siamese-twin stocks. Royal Dutch Shell is an ideal object of study for three reasons. First, it is one of the biggest and most liquid stocks. Second, the Siamese-stocks are based on the exactly same cash flows. Finally, the stocks of Royal Dutch Shell can be arbitraged easily, contrary to the arbitrage between closed-end fund shares and net assets. Royal Dutch was listed on the American Exchange, while Shell was listed on the London Stock Exchange. The two firms merged in 1907 on a 60-40 split. It means that the price of Royal Dutch shares is 50% higher than that of Shell. An regression model is used by the authors, which shows that the deviation from the equilibrium price is as high as 35%. Their study comes to a conclusion that there are three possible sources for the observed market segmentation. First, tax-induced investor heterogeneity may influence holding patterns by investors when the price of Shell stocks is lower than

that of Royal Dutch stocks. Nevertheless, it can explain only a few twin stocks, since most of the investors face the same tax treatment in their examples. Second, market-wide noise imposes a more significant effect on the locally traded shares than on foreign traded shares. Thus, a greater proportionate price movement in the locally traded stocks is caused than in the foreign traded stocks. Third, institutional inefficiencies can play a role in co-movements of the Siamese-twin stocks. Classified as a 'domestic' stock, one twin seems to have higher liquidity and inclusion in the domestic market, thus, relieving some agency problems and informational asymmetries problems. Also, Froot and Dabora (1998) point out that arbitrage would eliminate the price disparity in a perfectly integrated world.

Wang, Shuye, and Jiang (2004) demonstrate that the H-shares and A-shares are differently related to the domestic and offshore markets. A-shares are more related to market-specific risk and investor sentiment in mainland China. However, H-shares are subject to market-specific risk and investor sentiment that is specific to mainland China as well as Hong Kong. To a great extent, he discount of H-shares can be contributed to relative market illiquidity and the local and offshore stock market indices. The authors also show that the expected devaluation of Renminbi contributes to the price discount of H-shares.

Li, Yan, and Greco (2006) demonstrate that the systematic risk premiums are the primary contributor to the price disparities by studying the share prices of 13 companies dual-listed in Hong Kong and Shanghai over the period of January 1997 to March 2002. The price premiums of A-shares compared to H-shares are mainly due to the market risk premium in mainland China. The price premiums of H-shares

compared to A-shares can be contributed to both Hong Kong and mainland China's markets. The authors also point out that the H-share discount are greatly correlated to the discounts of Hong Kong market relative to mainland Chinese market and the difference of saving rates between Hong Kong and mainland China. Their study incorporates the period of Asian financial crisis, in which Hong Kong market is influenced much greater than mainland-Chinese market. Therefore, their study of the time period of financial crisis might be meaningless because of the interference. The short time period studied indicates there might be other statistically significant determinants of the price variations. After the authors add some other variables to the model, the price differentials are better explained. Nevertheless, the exchange rate is proved to be of no significance in determining the price discounts of H-shares related to A-shares, though the exchange rate change of Hong Kong dollars and Chinese yuan are more and more correlated.

Qiao, Chiang, and Wong (2008) use a unique FIVECM-BEKK GARCH method to study the short-term adjustment, long-term equilibrium, and spillover effects among shares of several Chinese stock markets, including H-shares (H), Shanghai A-shares (SHA), Shanghai B-shares (SHB), Shenzhen A-shares (SHA), and Shenzhen B-shares (SZB). They examine the relationships of H-SHA, SHB-SHA, SHB-HK, HK-SZA, SZB-SZA, and SZB-HK. They conclude that the six pairs of stock markets are partially correlated. The Hong Kong stock market is adjusted to return to equilibrium with the corresponding two A-share markets, and the two B-share markets is adjusted to return to equilibrium with the comparative Hong Kong market and two A-share markets. The effect of volatility spillover indicates that the volatility between the A-share markets and the B-share markets and between B-share markets

and the Hong Kong market are bidirectional. Nevertheless, the unidirectional volatility spillover effect can only be detected from the Hong Kong stock market to the A-share markets. A-share markets are the predominant in both mean and volatility spillover effects among the six pairs of comparisons. Qiao, Chiang, and Wong (2008) also find that there is an increase in the correlation between the A-share markets and B-share markets with the deregulation of government restrictions on trading B-shares by the individual mainland investors. This implies that the two classes of markets are integrating gradually.

Arquette, Brown, and Burdekin (2008) study the relationship of the discount rates for ADRs on the NYSE and H-shares on the HKSE to their Siamese-twin A-shares on the SHSE from 1998 to 2006. The authors use a model, involving variables of the expected change in the exchange rates, market sentiment, company sentiment, market capitalization and dividends, to examine the determinants of the discount. The expected change in the exchange rates is estimated as the 12-month futures rate. The results of the regression model reveal that the expected change in the exchange rates explains almost as much as 40% of the whole variation in the discount of both US ADRs and H-shares. The coefficient of the expected change in the exchange rates decreases when market sentiment variable is added to the model. The exchange rate of US Dollars to Renminbi would result in a much less impact on the H-share discount rates because neither A-shares nor H-shares are traded in US dollars. The market sentiment should be involved in the model, for the mainland-Chinese markets are segmented from offshore markets. The market sentiment variable is calculated as the ratio of the Shanghai A-share Index P/E ratio divided by the Hang Seng China Enterprises Index P/E ratio. The company sentiment variable represents the

sentiment of onshore investors towards a particular company. This variable is statistically significant for both the US ADRs and H-shares regression models. Investors in the SHSE are willing to pay more for a certain company because the onshore investors have higher company sentiment. Therefore, the discount for ADRs and H-shares will occur if offshore investors do not follow the step of onshore investors. The variables of market capitalization, dividends and company-specific fixed effects are not statistically significant in the model, which means they are other determinants of the discount rates.

Burdekin and Yang (2011) study the price discrepancy for four of the five the largest Chinese state-owned commercial banks (SOCBs), which are dual-listed in Shanghai and Hong Kong. The four SOCBs together account for over 28% of the whole Shanghai A-share market as of June 30, 2011, which makes them ideal representatives in studying market sentiment for dual-listed firms. These banks are favorable to investors because they are backed up by the government of China. The authors use a modified model based on the paper by Arquette et al, which includes a lagged discount variable, an average discount variable for the other three SOCBs, a market sentiment variable, two firm-specific sentiment variables, and the exchange rate change variable. The author finds that all of the H-shares of SOCBs are traded at a discount compare to the corresponding A-shares. However, the discount rates are quite different from one to another. The empirical application of the paper is that the results from the authors' study may give some insight into the future trend of H-shares and A-shares of Agricultural Bank of China, which is also one of the five largest SOCBs and dual-listed in Hong Kong and Shanghai late in July 2010.

Bae, Li, and Shi (2009) examine whether the law of one price holds better under a more flexible exchange rate regime. They study the discounts of B-shares and H-shares, which are mainly designed for offshore investors outside mainland China, relative to their Siamese-twin A-shares. Exchange rate regime of China was shifted to a more flexible exchange rate system in July 2005. The authors compare the discount rates before and after the shifts. Consistent with previous studies, the discount rates of H-shares are large relative to A-shares, and the discount rates of B-shares relative to A-shares are even larger. However, it is intriguing to find that the discounts become larger after the reform of exchange rate regime than before. This finding is against Mahajan and Furtado's (1996) point that the law of one price will hold better under a more floating exchange rate system, and Gultekin et al.'s (1989) point of the exchange rate transmission effect. Nevertheless, the attitude effect of the exchange rate system change and the investor expectation can explain the results well. In addition, market liquidity, information asymmetry and stock risk, which are always thought to be the three main determinants of the discounts of B-shares and H-shares, are not consistent with the increase of the discounts. It turns out that investor attitude effect dominates the increase in the discounts after the exchange rate system shifts. Therefore, the authors conclude that shifting to a more flexible exchange rate system does not make the discounts of B-shares and H-shares reduced, and investor attitude along with government regulation etc. leads to market segmentation and dominates the pricing differentials.

Sun, Tong, and Zhang (2013) study how cross-listings from an emerging economy affect the cross-listing firms and their host market, focusing on the mainland Chinese market and Hong Kong market. The authors examine the influence of mainland

Chinese listings in Hong Kong market in the aspects of quality and development of the Hong Kong stock market. Those Red Chip stocks promote the development of Hong Kong market. They enlarge the size of the market relative to its GDP, increase the trading volume relative to its market capitalization, and make the two markets more connected. The overall volatility of the market is also decreased by the increasing presence of mainland Chinese stocks in Hong Kong. However, the increase of the H-shares also causes higher spread, higher Amihad illiquidity ratio and lower turnover rate for other stocks of Hong Kong Stock Exchange. Moreover, it results in the synchronous movement of Hong Kong stocks and a decrease in their investment sensitivity to stock price movement, which implies that the information circumstance might change for the worse. Sun, Tong, and Zhang (2013) finally conclude that the benefits from the increasing presence of mainland Chinese firms listed Hong Kong exceed the disadvantages of it.

In conclusion, the literatures above employ various econometric models and variables to study the determinants of the pricing differentials of dual-listed firms in Hong Kong and mainland China, such as arbitrage, investor sentiment, government regulation, information asymmetry and macroeconomic movements. Regardless of continuous studies, there is not a perfect econometric model that can fully explain the phenomenon. Every study examines the relationship from a different perspective by choosing models that includes the most statistically significant variables from previous studies. Thus, a better model will be acquired in explaining the most of variation in the discounts.

Chapter 3: Data and Methodology

All the data utilized in this study was obtained from Bloomberg. The time spans of the data extend from August 3, 2007 to August 9, 2013, which covers the worldwide financial crisis period. Because of the short history of dual-listed companies in Chinese markets, the number of sample firms tested in the analysis is very limited. Tsingtao Brewery Co. Ltd. is the first firm to list in both Hong Kong market and mainland China market. From June 18, 2013 on, HSCEI consists of 40 constitutive stocks. 23 out of those 40 firms are dual-listed in both exchanges. Of these 23 firms, only 15 firms have been listed long enough so that they might have statistically significance and the data can be gained through the time spans. If firms are listed on more than two exchanges, they should be excluded from the examination. The model used in this study is not able to seize the effect of a third exchange, which might impose a statistically significant influence on the movements of the Hong Kong H-shares and the Shanghai A-shares. Also, the firms without sufficient number of data should be rejected. Therefore, the number of objective firms is reduced to 10. Further examination of the earnings of these firms leads to a list of nine companies. Price-earnings ratio is important in the regression model, as it represents the market and investor sentiment. Therefore, the firms used in the regression model should have positive earnings all over the time period.

Observations were collected on a week-over-week basis, rather than daily or monthly, in order to capture the price movements which might fluctuate too much in daily data or might not be apparent in monthly data. The data for share prices, P/E ratios, and P/B ratios for each company were acquired from Bloomberg as well as RMB/HKD exchange rates, HKD/USD exchange rates, USD/RMB exchange rate, the Shanghai

Composite Index, the Shanghai A-share Index， the Hang Seng Index, the Hang Seng China Enterprises Index, and the P/E and P/B ratios for the Shanghai Stock Exchange A-share Index, the Hang Seng Index, the Hang Seng China Enterprises Index.

The weekly changes in the exchange rates are used to verify the impact of the expected change in exchange rates on the discount rates of H-shares relative to A-shares. The factor of the expected change in exchange rates is included in the model, as it has been proved to have a significant influence on the movement of the discount rates of dual-listed shares by many others before. The current changes in the exchange rates are used in place of the expected changes in exchange rates in this study, because it has been proved to make no difference by past studies.

The weekly growth rates of both the Shanghai Composite Index are used in the model here to examine the impact of the market movements on a particular stock. The growth rates of indices are correlated with the market risk, which has been demonstrated by many studies to contribute significantly to the variation of the H-share discount rates. A lower growth rate in one index than the other would signal that investors are less willing to invest in this market. If the growth rates in the Shanghai Composite Index are lower than those in the Hang Seng Index, it would imply a decrease in the H-share discount rates, and vice versa. Mainland Chinese securities are only impacted by the market risk premiums of mainland Chinese market. However, the Hong Kong securities are influenced by the market risk premiums of both Hong Kong and mainland China markets.

The price-earnings ratios for firms and indices are included in the model to represent the investor and market sentiment. Because the price disparity of Siamese-twin shares can be partly due to the information asymmetry, the market sentiment can explain a significant part of the discount rates. The firm and market sentiment is expressed by comparing firm and market P/E ratios. Thus, P/E ratios are used as a proxy to examine the relationship between investor sentiment and the discount rates of H-shares relative to A-shares. A quarterly investor sentiment series published by people's Bank of China is used by Burdekin and Redfern (2008) as investor and market sentiment. Because lots of business cycles could be included in a quarterly cycle, the movements of discount rates would be lack of significance. In this study, weekly observations are obtained to overcome the problem instead of monthly or quarterly.

P/E ratios have always been used to reflect the investor sentiment, for it indicates how much investors are willing to pay for each dollar of firm's earnings. The relative P/E ratios for Hang Seng China Enterprises Index and the Shanghai A-share Index are used as a proxy for the market sentiment, as a lower ratio in Hong Kong market relative to the Shanghai market indicates a higher discount of H-shares relative to A-shares. The P/E ratio of a firm relative to the corresponding market's P/E ratio can also be used to reflect the local investor sentiment for a specific firm. In order to have a comparable and homogeneous P/E variable, some of the proper constituent stocks of the Hang Seng China Index are chosen as the sample objects.

The P/B ratios are introduced in the model to test whether firms are consistently undervalued or overvalued. The P/B ratios are usually used in the valuation of a firm.

Li, Yan, and Greco (2006) demonstrate that market risk contributes a remarkable portion of the variation of the discount rates of H-shares relative to A-shares, for market premiums can cause firms underpriced or overpriced. A higher P/B ratio indicate that a company is overpriced, which is a sign of a lack of confidence of investors in the company. The P/B ratio is not a perfect proxy to estimate the value a firm, for the book value of a firm could be manipulated in the real world. However, the P/B ratio might still be an effective way in the estimation of firms' values. Therefore, the market and firm P/B ratios are incorporated in this study to examine the relationship between the ratios and the H-share discounts, as well as the market sentiment.

The companies' discount rate in this study is calculated as following:

H-share Discount = [H-share Price in HKD – A-Share Price in RMB/(RMB/HKD Exchange Rate)]/H-share Price in HKD

The regression model for the discount rates of H-shares relative to A-shares is as following:

$$\text{H-Share-discount}_t = \alpha_0 + \beta_1 \text{ Lagged-Discount}_t + \beta_1 \text{ Exchange-Rate-Change}_t + \beta_2 \text{ Growth-of-Hang-Seng-Index}_t + \beta_3 \text{ Growth-of-Shanghai-Composite-Index}_t + \beta_4 \text{ Market-Sentiment}_t + \beta_5 \text{ Company-Sentiment-HK}_t + \beta_6 \text{ Company-Sentiment-SH}_t + \beta_7 \text{ Market-Price/Book-Ratio}_t + \beta_8 \text{ HK-Price/Book-Ratio}_t + \beta_9 \text{ SH-Price/Book-Ratio}_t + \varepsilon_t$$

The Lagged-Discount variable represents the lagged discount rate for the individual company. The Exchange-Rate-Change variable represents the weekly exchange rate through the study period. The Growth-of-Hang-Seng-Index variable and Growth-of-Shanghai-Composite-Index variable represent the growth rates of the

Hang Seng Index and the Shanghai Composite Index respectively, calculated by the weekly price of the index divided by the index price of previous week and then subtracting one. The Market-Sentiment variable is calculated by the Shanghai Stock Exchange A-share Index P/E ratio divided by the Hang Seng China Enterprises Index P/E ratio and then subtracting one. The Company-Sentiment-HK variable represents the investor sentiment for Hong Kong H-shares, calculated by a firm's Hong Kong P/E ratio divided by the Hang Seng China Enterprise P/E ratio and then subtracting one. The Company-Sentiment-SH variable represents the investor sentiment for Shanghai A-shares, calculated by a firm's Shanghai P/E ratio divided by the Shanghai A-share Index P/E ratio and then subtracting one. The Market-Price/Book-Ratio variable is calculated by the A-share Index P/B ratio divided by the HSCEI P/B ratio and then subtracting one. The HK-Price/Book-Ratio variable is calculated by a firm's Hong Kong P/B ratio divided by the HSCEI P/B ratio and then subtracting one. The SH-Price/Book-Ratio variable is calculated by a firm's Shanghai P/B ratio divided by the Shanghai A-share Index P/B ratio and then subtracting one.

Chapter 4: Analysis of Results

The mean discount of the nine sample firms is -27.19% with a median of -12.83%, a largest premium of 7.66% and a highest discount of -109.12%. The overall H-share discount rate for the 17 selected firms in the HSCEI is -37.20% indicating that there is a trend of overall discounts of H-share prices relative to the corresponding A-share prices. During the studies' period, the largest average premium of the 17 firms is 23.71%, and the highest average discount is -109.12% with a median discount of -38.63%. See Table 2 and Table 6 for the list of nine sample firms and the 17 selected firms.

The discount rate before 2010 is very volatile and large relative to that after 2010, indicating that there has been some elimination in terms of price differentials. It falls to its current level of around -10.87% as of August 9, 2013. The price convergence could be explained by the integration of Hong Kong and mainland China markets. See Figure 2 for the time movements of the average discount rates.

Table 3 provides the correlation for sample firms discount rates and market variables. All of the correlation coefficients between the firm discount rates are positive and significant at the 99% confidence level. The correlation coefficients range from 0.4808 to 0.9121, which signals that the correlation between each firm's discount rates is very high. The correlation coefficients between Bank of China, China CITIC Bank, China Merchants Bank, Industrial and Commercial Bank of China are all higher than 0.8092, which indicates that there are higher levels of correlation for the discount rates among the same industry. The correlation coefficients between exchange rate and all the firms are not significant, except Bank of China, China

CITIC bank and Industrial and Commercial Bank of China. However, absolute value of the correlation coefficient for the three firms are all less than 0.1514. In addition, the correlation coefficients for Bank of China and Industrial and Commercial Bank of China are only significant at the 90% confidence levels. Hence, the exchange rate seems to be little significant for the discount rates of dual-listed firms. The correlation coefficients of the market sentiment variable are all negative and significant at the 99% confidence levels for all the firms.

Table 4 provides the results of the regression model. The coefficients of lagged own discount rate are all positive and significant at the 99% confidence level for all nine sample firms. The exchange rate change is only significant for China Merchant's Bank and Tsingtao Brewery at the 95% and 90% confidence levels, respectively, which signals that it does not make a difference whether to include the variable in the model or not. This point view is against the finding of previous studies. Arquette, Brown, and Burdekin (2008), and Burdekin and Redfern (2008) demonstrates that the expected change in exchange rate is significant at the 90% confidence level. Arquette, Brown, and Burdekin (2008) find that more than 40% of the whole variation in the H-share discount can be explained by the expected change in the exchange rate. However, the coefficient of the exchange rate change falls sharply when the market sentiment variable is added to the model. Spitzer (2011) attributes the less significance of the exchange rate change in the discount to the consistent and continual convergence of international markets, especially the increasing integration of mainland Chinese and Hong Kong's economy.

The Hang Seng Index growth rate and Shanghai Composite Index growth rate are all

significant at the 99% confidence level for all firms. The coefficients of Hang Seng growth rate are all positive for all firms, while those of Shanghai Composite growth rate are all negative. This is completely consistent with the traditional finance theory, as the discount rates of H-shares are expected to decrease for an increased growth in Hong Kong market, and the discount rates are expected to increase for an increased growth in Shanghai market. Overall, the absolute values of the coefficients of those two variables are remarkably large relative to most of other variables, signalling that the market movements are very influential on the securities.

However, Spitzer (2011) gets some paradoxes on the regression results for the index growth variables. The sign of the two index growth variables for each firm are diverse. In addition, most of the coefficients for the both growth rate are not significant, which is not as what the author tells. Spitzer (2011) provides a possible explanation for the unexpected lack of significance and sign change. He suggests that it could result from investors' increased confidence in the performance of those firms. The investors could observe those firms individually and use only the dual-listed firms in comparison. Thus, the significance of the particular nature and movements of the H-share and A-share markets on the discounts would fade. The author's finding is contrary to his previous studies and mine. The author's explanation is probably not convincible. The disaccord could be due to some faults in collecting data and calculating value of variables. For example, some of the minimum values for the relative price-to earnings ratios and relative price-to-book ratios are less than minus one, which is not expected to happen. In addition, the author uses the first difference of the firm's Hong Kong P/E over the Hang Seng China Enterprises Index P/E to measure the firm's Hong Kong investor sentiment variable, which is different

than the way the variable is calculated. All of those could probably be the reasons why the author comes into various paradoxes for the results.

The results of the sentiment variables are perfectly consistent with the past theories and studies. The market sentiment, expressed as the Shanghai Stock Exchange A-Share Index P/E ratio over the Hang Seng China Enterprise Index P/E, is negative and significant at the 99% confidence level for all the firms. The negative sign indicates that the discount of H-shares increase as the relative market P/E ratio rises. As previously mentioned, the market sentiment is not only a critical factor in explaining the H-share discounts, but that the measurement of market sentiment with the relative Shanghai/Hong Kong P/E ratio is a practical proxy representing investor sentiment.

The coefficients of firm's Hong Kong investor sentiment variable are significant at the 99% confidence level for eight out of nine firms and at the 95% confidence level for Anhui Conch Cement Co. The coefficients are all positive, as an increased firm's Hong Kong P/E ratio is expected to result in a smaller H-share discount. Similar to the firm's Hong Kong investor sentiment variable, the coefficients of firm's Shanghai investor sentiment variable are all negative and significant at the 99% confidence level for all the sample firms. The negative sign indicates that an increased firm's Shanghai investor sentiment variable is expected to cause a decrease in the H-share discount.

The coefficients of the market P/B ratio are negative for all the firms except Tsingtao Brew Co Ltd. The market P/B variable is significant at the 99% confidence level for

all the firms but China Merchants' Bank and Tsingtao Brew Co Ltd. The relative significance of the variable as a whole signals that the market P/B ratio variable could play a significant role in the movement of the H-share discount rate, which is contrary to Spitzer's (2011) finding.

The firm's Hong Kong relative P/B ratio is positive for all the firms, significant at 99% confidence level for seven out of nine firms and significant at the 95% confidence level for the other firm. The positive coefficient sign indicates that the H-share discount will decrease if the firm's Hong Kong relative P/B ratio increases. The firm's Shanghai relative P/B ratio is negative for eight out of nine firms, significant at the 99%, 95%, and 90% confidence levels for four, one and two firms, respectively. The negative coefficient sign implies that an increase in the firm's relative Shanghai P/B ratio will cause a corresponding increase in the H-share discount rate. Generally speaking, an increase in a firm's P/B ratio comes with an increase in a firm's return on equity. Therefore, the disaccord of the coefficient sign of the firm's Shanghai P/B ratio for the one firm could be explained by the Hong Kong investors' increasing confidence in the firm.

The regression model in the above is just one of the many forms which can be used by investors to take positions in the dual-listed companies. There are generally three trends for the discount rate. First, the firm's H-share discount will decrease as the Hang Seng Index increases, and will increase as the Shanghai Composite Index increases. Second, the H-share discount will decrease as the firm's Hong Kong P/E ratio increases and will increase as the firm's Shanghai P/E ratio decreases. Third, an increase in the firm's Hong Kong P/B ratios leads to a decrease in the H-share

discount, while an increase in the firm's Shanghai P/B ratio in the H-share discount. However, P/B ratios are less significant than P/B ratio. It only provides a less consistent method than P/E ratios. The P/B ratios are more comparable for the firms within the same sectors in the valuation of firms. The changes in the exchange rates have little effect on the H-share discount rates.

Table 5 show the results of a similar regression model without the P/B variables which is used to examine whether it makes a difference to include the P/B ratios. The lagged own discount, the change in exchange rates, growth rates of the Hang Seng Index and Shanghai Composite Index, the market and investor sentiment variables are incorporated in the model. Most of the absolute values of the coefficients of the new regression model are slightly larger than those of the regression model with P/B ratios. The adjusted R-squared from the new regression model are 0.0032 smaller on average than that from the original one. Such a slight decrease in the R-squared indicates that the P/B ratio is not effective in the measurement of investor confidence. Spitzer (2011) suggests that the lack of significance could possibly result from the manipulation of the book values by the management through share buybacks or changing cash reserves. The P/B ratio variable might be more significant if return on equity for each firm is added to the regression model. It is because people generally think that there is a positive correlation between the P/B ratio and return on equity.

It is easily understandable that firms in the same sector are supposed to have high levels of correlation relative to firms in different sectors, as we can see from Table 3 that the correlation coefficients between the firms in the financial sector are generally higher than the others as a whole. The discount rates of firms from a particular sector

might be larger than those of firms from other sectors. See table 6 for the list of 17 firms included in HSCEI sector-by-sector correlation matrix, sector classifications and some related statistics. Table 7 provides the correlation matrix for the 17 firms in the Hang Seng China Enterprise Index.

All of the H-share discount rates are correlated at the 99% confidence level except three. The correlation coefficients vary widely from -0.1736 to 0.9121, which means the levels of correlation between some firms are extraordinarily high and some are low. The firms from the customer goods sector and properties & construction trade on average at premiums of 5.44% and 7.66%, respectively. This could signal the Hong Kong investors' great confidence in the Chinese economy, as investment, export and consumption are the "Troika" to drive Chinese economic developments. There are only two sample firms in the list of consumer goods. Though the two firms are highly correlated, one is traded at a premium of 23.71% and the other is traded at a discount of -12.83%. The correlation coefficients between the five financials firms are relatively large overall. The average discount rate of the five financial firms is -12.78%, which is much smaller than those of firms traded at discount on average. This is consistent to the previous studies as offshore investors value the background of state-backup. The average discount rates of firms in the sectors of energy, materials, services and utilities are extremely high relative to the others, signalling lack of confidence in these firms. One reasonable explanation could be that they are all capital intensive and submit to stringent regulation. Another possible explanation is that there is a lack of information and transparency owing to the degree of government involvement with the firms and their market position. The variation of the discount rates could act as an indicator of investor confidence to some extent.

The material sector has the highest average premium of 7.66%, and meanwhile it has the smallest standard deviation. There is a high level of correlation between the two firms in the consumer goods sector as well as among the financial firms. The two firms in the energy sectors have the lowest level of correlation, which could be caused by heterogeneity between the industries of coal and petroleum. Most of the signs of the correlation coefficients are positive, while only a few are slightly negative. This implies that most of the firms follow the same pattern of movements of discount rates. Investor could take advantage of the above findings to benefit themselves.

Chapter 5: Conclusion

The price disparity between Hong Kong H-shares and corresponding China A-shares exists continuously. Basically, this anomaly is caused by the market segmentation and some other factors. The pricing differentials have the trend to fade away from the perspective of the long term, as the economies of Hong Kong and mainland China keep integrating and mainland China move forward its open policy further and further. Especially from 2010 on, the discount rates have diminished significantly. However, the discount still remains at a remarkable level.

Firms' investor sentiment in Hong Kong and China is a critical factor in determining the discount rates between H-shares and A-shares. Generally, an increase in a firm's Hong Kong investor sentiment leads to a lower H-share discount rate relative to its corresponding A-share whereas an increase in a firm's Shanghai investor sentiment leads a higher discount rate. The changes in the exchange rate and the P/B ratios are of little significance in the determination of H-share discounts. On the contrary, the market trends are proved to be important in the explanation of the discount rates.

Most of the discounts rates of dual-listed firms are positively correlated and are significant at the 99% confidence level whereas a very few have a slightly negative correlation relationship. Firms in a same sector tend to have a high level of correlation. The degree of correlation in some sectors are much higher than the other sectors, which indicates that firms in some particular sectors move in a more close pattern and the others are not that correlated. The correlation between different sectors is not discussed in this paper because it is too complicated and the firms in the same sector could have totally different degrees of correlation with firms in the

other sectors. However, investors can at least find out the sectors with high levels of correlation to take advantage of in the prediction.

The persistence of pricing differentials in dual-listed firms in Hong Kong and mainland China indicates that the perception of the values of the same firms differs between Hong Kong and mainland China investors. On the one hand, the prices of H-shares and corresponding A-shares are supposed to converge gradually in the long run. On the other hand, in spite of the trend of price convergence, the price differentials will keep on existing as long as the asymmetry between mainland Chinese investors and Hong Kong investors is not eliminated. Investors could take advantage of such a market opportunity by identifying sector and sentiment patterns.

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Appendix

Table 1: Firms Included in Sample

SEHK Symbol (H-Share)	SSE Symbol (A-Share)	Listing Name	Company Name	SEHK Initial Listing Date	SSE Initial Listing Date	Industry Classification
00914.HK	600585	ANHUI CONCH	Anhui Conch Cement Co	October 21, 1997	February 7, 2002	Properties & Construction
03988.HK	601988	BANK OF CHINA	Bank of China Ltd.	June 1, 2006	July 5, 2006	Financials
03328.HK	601328	BANKCOMM	Bank of Communication Co Ltd.	June 23, 2005	May 15, 2007	Financials
00998.HK	601998	CITIC BANK	China CITIC Bank Corp Ltd.	April 27, 2007	April 27, 2007	Financials
03968.HK	600036	CM Bank	China Merchants Bank	September 22, 2006	April 9, 2002	Financials
00386.HK	600028	SINOPEC CORP	China Petroleum & Chemical Co	October 19, 2000	August 8, 2001	Energy
01398.HK	601398	ICBC	Industrial and Commercial Bank of China Ltd.	October 27, 2006	August 8, 2001	Financials
00358.HK	600362	JIANGXI COPPER	Jiangxi Copper Co Ltd.	June 12, 1997	January 11, 2002	Materials
00168.HK	600600	TSINGTAO BREW	Tsingtao Brew Co Ltd.	July 15, 1993	August 27, 1993	Consumer Goods

Table 2: Summary Statistics for the Firm H-S hare Discount Rates and Variables

	Observations	Mean	Standard Dev.	Minimum	Maximum
Average Sample Firm Discount	9	-27.19%	36.65%	-109.12%	7.66%
Discount Rates					
Anhui Conch Cement Co	307	7.66%	12.95%	-42.52%	25.50%
Bank of China Ltd.	307	-24.55%	27.36%	-109.02%	16.28%
Bank of Communication Co Ltd.	306	-6.70%	19.53%	-68.54%	23.75%
China CITIC Bank Corp Ltd.	307	-38.63%	29.67%	-136.81%	3.03%
China Merchant's Bank	306	-0.7%	17.60%	-53.16%	25.75%
China Petroleum & Chemical Co	307	-55.82%	46.14%	-155.57	9.95%
Industrial and Commercial Bank of China Ltd.	307	-4.02%	17.68%	-67.980%	23.03%
Jiangxi Copper Co Ltd.	307	-109.12%	52.98%	-258.87%	-25.78%
Tsingtao Brew Co Ltd.	307	-12.83%	23.03%	-82.46%	14.83%
Market Sentiment (Shanghai/Hong Kong P/E Ratio)	307	38.82%	19.52%	-21.08%	132.13%
Exchange Rate Change (RMB/USD)	307	0.07%	0.21%	-0.56%	0.83%
Hang Seng Index Growth Rate	307	0.06%	3.82%	-20.80%	12.43%
Shanghai Composite Index Growth Rate	307	-0.17%	3.79%	-13.84%	14.96%
Market P/B Ratio (Shanghai Index/Hong Kong Index P/B)	307	27.57%	20.95%	1.70%	102.62%
Relative Firm Price/Earnings Ratios					
Anhui Conch Cement Hong Kong P/E	307	0.5549	0.2977	-0.1928	1.2357
Anhui Conch Cement Shanghai P/E	307	-0.0274	0.2338	-0.4316	0.5635
Bank of China Ltd. Hong Kong P/E	307	-0.3100	0.0749	-0.4830	-0.0860
Bank of China Ltd. Shanghai P/E	307	-0.3987	0.1016	-0.5349	0.1073
Bank of Communication Co Ltd. Hong Kong P/E	306	-0.2242	0.2026	-0.8054	0.4205
Bank of Communication Co Ltd. Shanghai P/E	210	-0.4995	0.0676	-0.5849	-0.2268
China CITIC Bank Corp Ltd. Hong Kong P/E	286	-0.3321	0.1487	-0.9044	0.0991
China CITIC Bank Corp Ltd. Shanghai P/E	287	-0.3473	0.1926	-0.5743	0.2196
China Merchants Bank Hong Kong P/E	306	-0.0013	0.3140	-0.4523	0.9448
China Merchants Bank Shanghai P/E	306	-0.3075	0.1984	-0.5773	0.2058
China Petroleum & Chemical Corporation Hong Kong P/E	307	-0.2213	0.2663	-0.5622	0.7080
China Petroleum & Chemical Corporation Shanghai P/E	307	-0.1412	0.3690	-0.5430	1.5171
Industrial and Commercial Bank of China Ltd. Hong Kong P/E	286	-0.1923	0.1069	-0.3610	0.1415
Industrial and Commercial Bank of China Ltd. Shanghai P/E	307	0.5994	0.1119	0.4691	1.2757
Jiangxi Copper Co Ltd. Hong Kong P/E	307	0.0403	0.6646	-0.8105	2.2523
Jiangxi Copper Co Ltd. Shanghai P/E	307	0.6344	1.4140	-0.6372	5.4167
Tsingtao Brew Co Ltd. Hong Kong P/E	286	1.6897	0.6418	0.3723	3.2578
Tsingtao Brew Co Ltd. Shanghai P/E	307	1.1498	0.3719	0.3152	3.1414
Relative Firm Price/Book Ratios					
Anhui Conch Cement Co Hong Kong P/B	307	0.6176	0.3463	-0.1326	1.5850
Anhui Conch Cement Co Shanghai P/B	307	0.2238	0.2588	-0.3107	0.7694
Bank of China Ltd. Hong Kong P/B	307	-0.2978	0.0684	-0.4754	-0.1642
Bank of China Ltd. Shanghai P/B	307	-0.4523	0.0914	-0.6966	-0.2271
Bank of Communication Co Ltd. Hong Kong P/B	306	-0.1113	01889	-0.3870	0.4334
Bank of Communication Co Ltd. Shanghai P/B	306	-0.3181	0.1387	-0.5553	0.0288
China CITIC Bank Corp Ltd. Hong Kong P/B	307	-0.3290	0.0888	-0.5259	-0.0603
China CITIC Bank Corp Ltd. Shanghai P/B	307	-0.4818	0.0885	-0.6677	-0.2739
China Merchant's Bank Hong Kong P/B	306	0.3507	0.4194	-0.1082	1.4331
China Merchant's Bank Shanghai P/B	306	0.0135	0.2286	-0.2886	0.6244
China Petroleum & Chemical Co Hong Kong P/B	307	-0.2915	0.1048	-0.4698	-0.0468
China Petroleum & Chemical Co Shanghai P/B	307	-0.4366	0.1106	-0.6309	-0.1984
Industrial and Commercial Bank of China Ltd. Hong Kong P/B	307	0.0753	0.1497	-0.1622	0.4660
Industrial and Commercial Bank of China Ltd. Shanghai P/B	307	-0.1785	0.0736	-0.3140	0.0977
Jiangxi Copper Co Ltd. Hong Kong P/B	307	-0.1658	0.1547	-0.6574	0.1000
Jiangxi Copper Co Ltd. Shanghai P/B	307	-0.3305	0.1634	-0.7753	0.0022
Tsingtao Brew Co Ltd. Hong Kong P/B	307	1.3575	0.6460	0.1183	3.2344
Tsingtao Brew Co Ltd. Shanghai P/B	307	0.8668	0.5935	-0.2938	2.2426

*All data points are weekly observations collected from August 3, 2007 to August 9, 2013.

Table 3: Correlation Matrix for Firm Discount Rate and Market Variables

	Anhui Conch Discount	*Bank of China Discount*	Bank Comm *Discount*	Citic Bank *Discount*	*CM Bank Discount*	*Sinopec Corp Discount*	*ICBC Discount*	*Jiangxi Copper Discount*	*Tsingtao Brew Discount*	*Exchange Rate*	*Market P/E*
Anhui Conch Discount	1.0000										
Bank of China Discount	0.6019*** (0.0000)	1.0000									
Bank Comm *Discount*	0.7050*** (0.0000)	0.8554*** (0.0000)	1.0000								
Citic Bank *Discount*	0.7129*** (0.0000)	0.8834*** (0.0000)	0.8270*** (0.0000)	1.0000							
CM Bank Discount	0.5955*** (0.0000)	0.8697*** (0.0000)	0.8691*** (0.0000)	0.8092*** (0.0000)	1.0000						
Sinopec Corp Discount	0.6783*** (0.0000)	0.6368*** (0.0000)	0.6258*** (0.0000)	0.6622*** (0.0000)	0.6087*** (0.0000)	1.0000					
ICBC Discount	0.6139*** (0.0000)	0.9121*** (0.0000)	0.8913*** (0.0000)	0.8325*** (0.0000)	0.8608*** (0.0000)	0.4808*** (0.0000)	1.0000				
Jiangxi Copper Discount	0.6790*** (0.0000)	0.6956*** (0.0000)	0.7136*** (0.0000)	0.7323*** (0.0000)	0.6728*** (0.0000)	0.8761*** (0.0000)	0.5688*** (0.0000)	1.0000			
Tsingtao Brew Discount	0.5638*** (0.0000)	0.7809*** (0.0000)	0.6135*** (0.0000)	0.7237*** (0.0000)	0.7202*** (0.0000)	0.6981*** (0.0000)	0.6386*** (0.0000)	0.6603*** (0.0000)	1.0000		
Exchange Rate	-0.0844 (0.1401)	-0.1005* (0.0786)	-0.0507 (0.3762)	-0.1514*** (0.0079)	-0.0874 (0.1264)	-0.0415 (0.4688)	-0.1008* (0.0778)	0.0052 (0.9278)	-0.0878 (0.1249)	1.0000	
Market P/E	-0.6143*** (0.0000)	-0.7073*** (0.0000)	-0.7725*** (0.0000)	-0.7715*** (0.0000)	-0.6719*** (0.0000)	-0.3820*** (0.0000)	-0.7884*** (0.0000)	-0.5276*** (0.0000)	-0.4576*** (0.0000)	0.0396 0.4894	1.0000

*****The data in parentheses are P-values, and ***, **, and * denote significance at the 99%, 95%, and 90% confidence levels, respectively.

Table 4: OLS Regression Results for the Firm's H-Share Discounts Including the Price/Book Ratios

	Dependent Variable								
	Anhui Conch	Bank of China	Bank Comm	Citic Bank	CM Bank	Sinopec Corp	ICBC	Jiangxi Copper	Tsingtao Brew
Lagged Own Discount	.8003*** (.0306)	.4464*** (.0285)	.7109*** (.0386)	.5550*** (.0353)	.6063*** (.0333)	.7772*** (.0303)	.2724*** (.0321)	.6600*** (.0285)	.4387*** (.0341)
Exchange Rate Change	.0675 (1.3869)	-.7871 (.8857)	-.3200 (1.0332)	2.3361 (1.6004)	-2.4242** (1.0129)	-1.5208 (2.3028)	-.18122 (.6771)	2.2097 (3.1165)	2.4312* (1.4050)
HSI Growth Rate	.7305*** (.0851)	.5778*** (.0667)	.7870*** (.0995)	.6711*** (.1166)	.7010*** (.0728)	1.5157 *** (.1557)	.2774*** (.0563)	2.5166*** (.2140)	.2122** (.0871)
Shanghai Composite Growth	-.3817*** (.0820)	-.4586*** (.0583)	-.5429*** (.0861)	-.5729*** (.0996)	-.5200*** (.0674)	-1.3982*** (.1509)	-.1527*** (.0440)	-1.9445*** (.1985)	-.1589* (.0831)
Market P/E	-.0673*** (.0256)	-.4427*** (.0312)	-.1585*** (.0459)	-.3722*** (.0414)	-.2968*** (.0270)	-.0909** (.0431)	-.5159*** (.0265)	-.4135*** (.0610)	-.5867*** (.0443)
Firm's Hong Kong P/E	.0250** (.0121)	.8748*** (.0597)	.1844*** (.0410)	.4999*** (.0586)	.2389*** (.0236)	.1226*** (.0470)	.7546*** (.0353)	.5670*** (.0650)	.1931*** (.0150)
Firm's Shanghai P/E	-.0474*** (.0159)	-1.0026*** (.0601)	-.5483*** (.0816)	-.6100*** (.0567)	-.2996*** (.0381)	-.1172*** (.0297)	-.9534*** (.0483)	-.3005*** (.0316)	-.2926*** (.0201)
Market P/B	-.0949*** (.0306)	-.1719*** (.0247)	-.1374*** (.0386)	-.1861*** (.0415)	-.0252 (.0234)	-.2290*** (.0689)	-.0950*** (.0150)	-.2113*** (.0806)	.0377 (.0365)
Firm's Hong Kong P/B	.0604*** (.0184)	.1120*** (.0501)	.1843*** (.0425)	.1728*** (.0581)	.0205 (.0143)	.3284*** (.1086)	.0041 (.0121)	.1884*** (.0652)	.0799*** (.0167)
Firm's Shanghai P/B	-.0763*** (.0235)	-.1092*** (.0363)	-.0665 (.0353)	-.0675* (.0573)	-.1076*** (.0266)	.1347 (.0927)	-.0462* (.0243)	-.17858** (.0706)	-.0536*** (.0185)
Constant	.0242** (.0104)	-.0746*** (.0142)	-.1326 (.0245)	-.0101*** (.0185)	.0203** (.0096)	.1193*** (.0297)	-.0551*** (.0073)	-.0361 (.0267)	.0956*** (.0167)
Adjusted R-squared	0.8720	0.9878	0.9487	0.9608	0.9603	0.9699	0.9813	0.9590	0.9578

*Standard errors are in parantheses, and ***, **, and * denote significance at the 99%, 95%, and 90% confidence levels, respectively.

Table 5: OLS Regression Results for the Firm's H-Share Discount Rates Without the Price/Book Variables

	Dependent Variable								
	Anhui Conch	Bank of China	Bank Comm	Citic Bank	CM Bank	Sinopec Corp	ICBC	Jiangxi Copper	Tsingtao Brew
Lagged Own Discount	.8292*** (.0287)	.5085*** (.0288)	.7451*** (.0390)	.6277*** (.0315)	.6748*** (.0290)	.8878*** (.0217)	.3355*** (.0328)	.6994*** (.0262)	.4823*** (.0323)
Exchange Rate Change	.2381 (1.3472)	-.9792 (.9209)	-.8447 (1.0754)	2.3873 (1.6274)	-1.9951* (1.0312)	-1.7001 (2.3655)	.3144 (.6995)	1.8597 (3.0841)	1.1308 (1.4597)
HSI Growth Rate	.7913*** (.0845)	.6901*** (.0690)	.8359*** (.1021)	.7979*** (.1149)	.7745*** (.0716)	1.7045*** (.1548)	.3572*** (.0588)	2.7142*** (.2073)	.2509*** (.0914)
Shanghai Composite Growth	-.3856*** (.0830)	-.5510*** (.0607)	-.5853*** (.0895)	-.6415*** (.1001)	-.5944*** (.0668)	-1.6296*** (.1496)	-.2195*** (.0459)	-2.0255*** (.2004)	-.1720* (.0878)
Market P/E	-.0938*** (.0186)	-.4872*** (.0300)	-.2456*** (.0421)	-.4280*** (.0407)	-.2826*** (.0256)	-.1482*** (.0322)	-.5282*** (.0284)	-.4932*** (.0480)	-.5217*** (.0375)
Firm's Hong Kong P/E	.0357 ** (.0115)	.8268*** (.0533)	.2337*** (.0413)	.5612*** (.0564)	.2442*** (.0241)	.1985*** (.0442)	.7297*** (.0371)	.5788*** (.0580)	.2090*** (.0136)
Firm's Shanghai P/E	-.0587*** (.0155)	-1.0221*** (.0617)	-.4706*** (.0758)	-.6383*** (.0579)	-.3663*** (.0359)	-.1304*** (.0304)	-.9689*** (.0494)	-.3056*** (.0294)	-.3013*** (.0199)
Constant	.0272* (.0100)	-.0830*** (.0115)	-.0790*** (.0183)	-.0113 (.0114)	-.0050 (.0072)	.0178 (.0113)	-.0690*** (.00697)	.0263 (.0167)	.1307*** (.0133)
Adjusted R-squared	0.8670	0.9859	0.9434	0.9583	0.9579	0.9676	0.9785	0.9575	0.9528

*Standard errors are in parantheses, and ***, **, and * denote significance at the 99%, 95% and 90% confidence levels, respectively.

Table 6: Select Firms Included in HSCEI Sector-by-Sector Correlation Matrix

HK Symbol	SSE Symbol	Listing Name	Company	Sector Classification	Mean Discount Rate	Standard Dev.	Maximum	Minimum
0489.HK	600006	Dongfeng Group	Dongfeng Motor Group	Consumer Goods	23.71%	51.90%	72.97%	-120.00%
0168.HK	600600	Tsingtao Brew	Tsingtao Brewery Co	Consumer Goods	-12.83%	23.03%	14.83%	-82.46%
0386.HK	600028	Sinopec Corp	China Petroleum & Chemical Corporation	Energy	-55.82%	46.14%	-9.95%	-155.57%
1171.HK	600188	Yanzhou Coal	Yanzhou Coal Mining Company	Energy	-70.93%	35.24%	-11.84%	-194.06%
3988.HK	601988	Bank of China	Bank of China Ltd.	Financials	-24.55%	27.36%	16.28%	-109.02%
3328.HK	601328	Bank Comm	Bank of Communications	Financials	-6.63%	19.54%	23.75%	-68.54%
2628.HK	601628	China Life	China Life Insurance	Financials	-2.21%	19.42%	23.30%	-76.38%
0998.HK	601998	CITIC Bank	China Citic Bank Corporation	Financials	-38.63%	29.67%	-3.03%	-136.81%
3968.HK	600036	CM Bank	China Merchants Bank	Financials	-0.66%	17.58%	25.75%	-53.16%
1398.HK	601398	ICBC	Industrial and Commercial Bank of China	Financials	-4.02%	17.68%	23.03%	-67.98%
2600.HK	601600	Chalco	Aluminum Corporation of China	Materials	-103.09%	37.47%	-43.22%	-238.55%
0358.HK	600362	Jiangxi Copper	Jiangxi Copper Company	Materials	-109.12%	52.98%	-25.78%	-258.87%
914.HK	600585	Anhui Conch	Anhui Conch Cement Co	Properties & Construction	7.66%	12.95%	25.50%	-42.52%
0753.HK	601111	Air China	Air China Limited	Services	-80.12%	54.14%	10.53%	-233.44%
1919.HK	601919	China Cosco	China Cosco Holdings	Services	-59.85%	35.72%	-1.72%	-177.23%
1138.HK	600026	China Ship Dev	China Shipping Development	Services	-40.28%	25.04%	9.02%	-102.34%
0902.HK	600011	Huaneng Power	Huaneng Power International	Utilities	-55.01%	26.75%	18.50%	-118.40%

*Industry classification is based on the categorization by the Hong Kong stock exchange.

Sector Comparison	Mean Discount Rate	Standard Dev.	Maximum	Minimum
Consumer Goods	5.44%	44.09%	72.97%	-120.00%
Energy	-63.38%	41.71%	-9.95%	-194.06%
Financials	-12.78%	26.40%	25.75%	-136.81%
Materials	-106.11%	45.95%	-25.78%	-258.87%
Properties & Construction	7.66%	12.95%	25.50%	-42.52%
Services	-60.04%	43.28%	10.53%	-233.44%
Utilities	-55.01%	26.75%	18.50%	-118.40%

Table 7: Correlation Matrix for Select Firms in the Hang Seng China Enterprise s Index

	Dongfeng Group	Tsingtao Brewery	Sinopec Corp China	Yanzhou Coal Comm	Bank of China	Bank Comm	China Life	CITIC Bank	CM Bank	ICBC	Chalco	Jiangxi Copper	Anhui Conch	Air China	China Cosco	China Ship Dev	Huaneng Power
Dongfeng Group	1.0000																
Tsingtao Brewery	0.8822*** (0.0000)	1.0000															
Sinopec Corp	0.7264*** (0.0000)	0.6981*** (0.0000)	1.0000														
Yanzhou Coal	0.1629*** (0.0042)	0.1416** (0.0130)	-0.0045 (0.9375)	1.0000													
Bank of China	0.8270*** (0.0000)	0.7809*** (0.0000)	0.6368*** (0.0000)	0.3519*** (0.0000)	1.0000												
Bank Comm	0.6585*** (0.0000)	0.6135*** (0.0000)	0.6258*** (0.0000)	0.3674*** (0.0000)	0.8554*** (0.0000)	1.0000											
China Life	0.6259*** (0.0000)	0.5507*** (0.0000)	0.3695*** (0.0000)	0.2385*** (0.0000)	0.7643*** (0.0000)	0.8434*** (0.0000)	1.0000										
CITIC Bank	0.8345*** (0.0000)	0.7237*** (0.0000)	0.6622*** (0.0000)	0.2358*** (0.0000)	0.8834*** (0.0000)	0.8270*** (0.0000)	0.7603*** (0.0000)	1.0000									
CM Bank	0.7671*** (0.0000)	0.7202*** (0.0000)	0.6087*** (0.0000)	0.5247*** (0.0000)	0.8697*** (0.0000)	0.8691*** (0.0000)	0.7530*** (0.0000)	0.8092*** (0.0000)	1.0000								
ICBC	0.7024*** (0.0000)	0.6386*** (0.0000)	0.4808*** (0.0000)	0.3723*** (0.0000)	0.9121*** (0.0000)	0.8913*** (0.0000)	0.8903*** (0.0000)	0.8325*** (0.0000)	0.8608*** (0.0000)	1.0000							
Chalco	0.3840*** (0.0000)	0.3579*** (0.0000)	0.2691*** (0.0000)	0.3855*** (0.0000)	0.6774*** (0.0000)	0.6847*** (0.0000)	0.6549*** (0.0000)	0.5782*** (0.0000)	0.5427*** (0.0000)	0.7668*** (0.0000)	1.0000						
Jiangxi Copper	0.6522*** (0.0000)	0.6603*** (0.0000)	0.8761*** (0.0000)	0.2358*** (0.0000)	0.6956*** (0.0000)	0.7136*** (0.0000)	0.4175*** (0.0000)	0.7323*** (0.0000)	0.6728*** (0.0000)	0.5688*** (0.0000)	0.4813*** (0.0000)	1.0000					
Anhui Conch	0.6220*** (0.0000)	0.5638*** (0.0000)	0.6783*** (0.0000)	-.0069*** (0.0000)	0.6019*** (0.0000)	0.7050*** (0.0000)	0.6246*** (0.0000)	0.7129*** (0.0000)	0.5955*** (0.0000)	0.6139*** (0.0000)	0.4614*** (0.0000)	0.6790*** (0.0000)	1.0000				
Air China	0.8678*** (0.0000)	0.8624*** (0.0000)	0.7874*** (0.0000)	0.0672 (0.2419)	0.7822*** (0.0000)	0.6225*** (0.0000)	0.5248*** (0.0000)	0.7466*** (0.0000)	0.6837*** (0.0000)	0.6424*** (0.0000)	0.4223*** (0.0000)	0.7574*** (0.0000)	0.7292*** (0.0000)	1.0000			
China Cosco	0.4693*** (0.0000)	0.4457*** (0.0000)	0.4588*** (0.0000)	0.4578*** (0.0000)	0.6805*** (0.0000)	0.6488*** (0.0000)	0.4125*** (0.0000)	0.6194*** (0.0000)	0.5668*** (0.0000)	0.6314*** (0.0000)	0.7791*** (0.0000)	0.6567*** (0.0000)	0.4420*** (0.0000)	0.5106*** (0.0000)	1.0000		
China Ship Dev	0.1764*** (0.0019)	0.1772*** (0.0018)	0.1247** (0.0290)	0.5809*** (0.0000)	0.5253*** (0.0000)	0.6356*** (0.0000)	0.5987*** (0.0000)	0.4370*** (0.0000)	0.5421*** (0.0000)	0.6520*** (0.0000)	0.7126*** (0.0000)	0.3380*** (0.0000)	0.3732*** (0.0000)	0.2298*** (0.0001)	0.6749*** (0.0000)	1.0000	
Huanneg Power	0.5549*** (0.0000)	0.5104*** (0.0000)	0.7509*** (0.0000)	-.1736*** (0.0000)	0.5373*** (0.0000)	0.4747*** (0.0000)	0.2955*** (0.0000)	0.5476*** (0.0000)	0.3419*** (0.0000)	0.3995*** (0.0000)	0.4217*** (0.0000)	0.7031*** (0.0000)	0.6640*** (0.0000)	0.7247*** (0.0000)	0.5317*** (0.0000)	0.1648*** (0.0000)	1.0000

*P-values (probability that the correlation is significant from 0) are in parentheses, and ***, **, and * denote significance at the 99%, 95%, and 90% confidence levels, respectively.

Figure 1: H-Share Mean Discount Rate and Market Sentiment

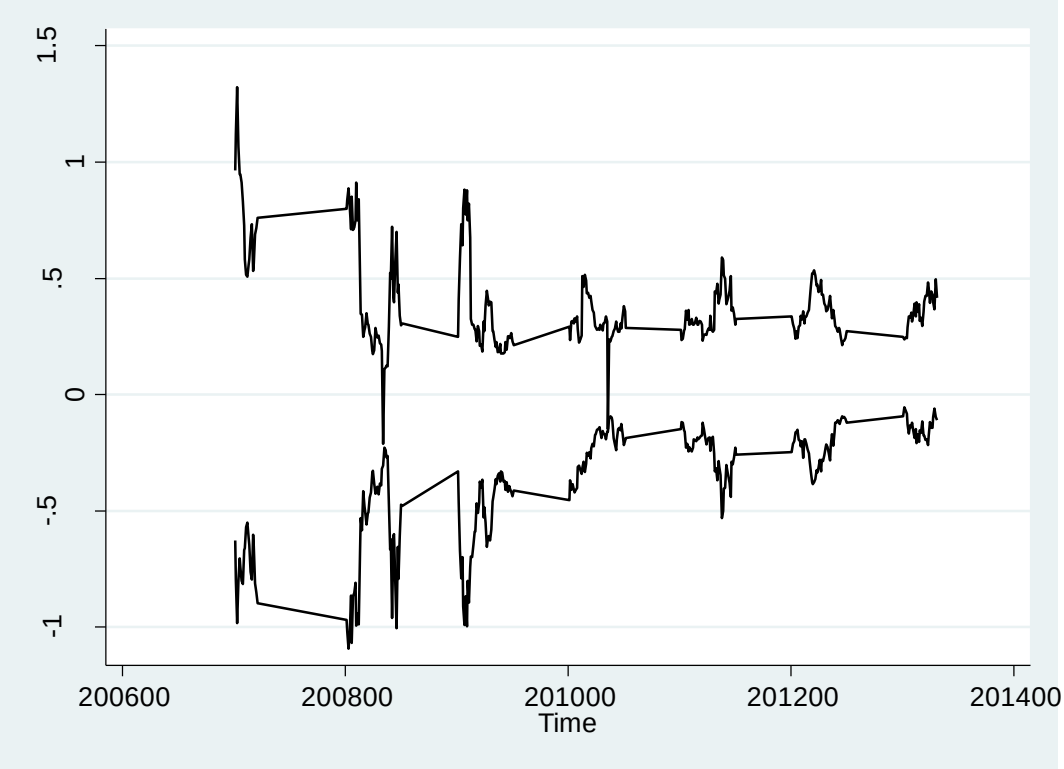

Figure 2: Mean Discount Rate of the Selected 17 Firms Through the Study Period